CLAIMS

1. A method of analyzing dioxins by laser ionization mass spectrometry using supersonic jet/resonance-enhanced multiphoton ionization, the method comprising:

the first step of obtaining respective specific wavelength spectra of a plurality of dioxin isomers whose concentrations are known, selecting a plurality of specific wavelengths from each of the specific wavelength spectra, and preparing calibration curves, each showing the relationship between the ion signal intensity and the dioxin isomer concentration at any one of the selected specific wavelengths, for all the specific wavelengths selected for each dioxin isomer;

the second step of preparing a sensitivity matrix showing the relationship between the ion signal intensities and the dioxin isomer concentrations at the specific wavelengths, from the calibration curves of the dioxin isomers prepared in the first step; and

the third step of obtaining a specific wavelength spectrum of a sample to be analyzed, and determining the concentrations of a plurality of dioxin isomers in the sample using the ion signal intensities of the specific wavelength spectrum of the sample and the sensitivity matrix prepared in the second step,

wherein in the first step, the specific wavelength spectra are obtained by repeating the sequence of exciting the dioxin isomers with a first laser light having a first wavelength, ionizing the excited dioxin isomers with a second laser light having a second wavelength, and measuring the intensities of ion signals, while the first wavelength of the first laser light is varied step by step, and the plurality of specific wavelengths are selected from each specific wavelength spectrum according to the following (1) to (3):

(1) for a dioxin isomer 1,2,3,4,6,7,8-HpCDD (heptachlorodibenzo-para-dioxin), at least one specific wavelength is selected from the group consisting of 317.66 nm, 317.36 nm, 315.10 nm, 314.60 nm, 314.37 nm, 313.65 nm, 312.96 nm, 312.80 nm, 312.20 nm, 311.90 nm, 311.61 nm, 311.00 nm, 310.39 nm, and 310.12 nm;

(2) for a dioxin isomer OCDD (octachlorodibenzo-para-dioxin), at least one specific wavelength is selected from the group consisting of 321.85 nm, 321.14 nm, 319.76 nm, 317.90 nm, 316.23 nm, 315.80 nm, 315.48 nm, 315.21 nm, 314.57 nm, 312.60 nm, 312.04 nm, 311.69 nm, and 310.87 nm; and

(3) for a dioxin isomer OCDF (octachlorodibenzofuran), at least one specific wavelength is selected from the group consisting of 329.89 nm, 329.41 nm, 329.28 nm, 329.11 nm, 329.02 nm, 328.93 nm, 327.35 nm, 326.38 nm, and 325.48 nm.

2. The method according to Claim 1, wherein the second step includes the sub-step of identifying dioxin isomers contained in the sample, and the sensitivity matrix is prepared according to the calibration curves of the dioxin isomers identified in the sub-step.

3. The method according to Claim 1, wherein the sensitivity matrix is prepared according to all the calibration curves prepared in the first step.

4. A method of analyzing dioxins which identifies a dioxin isomer from a specific wavelength spectrum obtained by laser ionization mass spectrometry using supersonic jet/resonance-enhanced multiphoton ionization, the method comprising:

the first step of obtaining a specific wavelength spectrum of a sample to be analyzed by repeating the sequence of exciting the sample with a first laser light having a first wavelength, ionizing the excited sample with a second laser light having a second wavelength, and measuring the intensity of ion signals, while the first wavelength of the first laser light is varied step by step; and

the second step of identifying 1,2,3,4,6,7,8-HpCDD (heptachlorodibenzo-para-dioxin) contained in the sample from the specific wavelength spectrum of the sample obtained in the first step and specific wavelengths of 1,2,3,4,6,7,8-

HpCDD (heptachlorodibenzo-para-dioxin) obtained in advance, by selecting at least two specific wavelengths from the specific wavelengths of 1,2,3,4,6,7,8-HpCDD (heptachlorodibenzo-para-dioxin) shown in Table 1 and determining whether the selected specific wavelengths are shown in the specific wavelength spectrum of the sample obtained in the first step.

Table 1

1,2,3,4,6,7,8-HpCDD (heptachlorodibenzo-para-dioxin)	
	Specific wavelength (nm)
1	317.66
2	317.36
3	315.10
4	314.60
5	314.37
6	313.65
7	312.96
8	312.80
9	312.20
10	311.90
11	311.61
12	311.00
13	310.39
14	310.12

5. A method of analyzing dioxins which identifies a dioxin isomer from a specific wavelength spectrum obtained

by laser ionization mass spectrometry using supersonic jet/resonance-enhanced multiphoton ionization, the method comprising:

the first step of obtaining a specific wavelength spectrum of a sample to be analyzed by repeating the sequence of exciting the sample with a first laser light having a first wavelength, ionizing the excited sample with a second laser light having a second wavelength, and measuring the intensity of ion signals, while the first wavelength of the first laser light is varied step by step; and

the second step of identifying OCDD (octachlorodibenzo-para-dioxin) contained in the sample from the specific wavelength spectrum of the sample obtained in the first step and specific wavelengths of OCDD (octachlorodibenzo-para-dioxin) obtained in advance, by selecting at least two specific wavelengths from the specific wavelengths of OCDD (octachlorodibenzo-para-dioxin) shown in Table 1 and determining whether the selected specific wavelengths are shown in the specific wavelength spectrum of the sample obtained in the first step.

Table 2

OCDD (octachlorodibenzo-para-dioxin)	
	Specific wavelength (nm)
1	321.85
2	321.14
3	319.76
4	317.90
5	316.23
6	315.80
7	315.48
8	315.21
9	314.57
10	312.60
11	312.04
12	311.69
13	310.87

6. A method of analyzing dioxins which identifies a dioxin isomer from a specific wavelength spectrum obtained by laser ionization mass spectrometry using supersonic jet/resonance-enhanced multiphoton ionization, the method comprising:

the first step of obtaining a specific wavelength spectrum of a sample to be analyzed by repeating the sequence of exciting the sample with a first laser light having a first wavelength, ionizing the excited sample with a second laser light having a second wavelength, and

measuring the intensity of ion signals, while the first wavelength of the first laser light is varied step by step; and

the second step of identifying OCDF (octachlorodibenzofuran) contained in the sample from the specific wavelength spectrum of the sample obtained in the first step and specific wavelengths of OCDF (octachlorodibenzofuran) obtained in advance, by selecting at least two specific wavelengths from the specific wavelengths of OCDF (octachlorodibenzofuran) shown in Table 1 and determining whether the selected specific wavelengths are shown in the specific wavelength spectrum of the sample obtained in the first step.

Table 3

OCDF (octachlorodibenzofuran)	
	Specific wavelength (nm)
1	329.89
2	329.41
3	329.28
4	329.11
5	329.02
6	328.93
7	327.35
8	326.38
9	325.48